

# **Luminescence properties of Dy implanted AlN thin films**

W. M. Jadwisieniczak<sup>1</sup>, H. J. Lozykowski<sup>1</sup>  
A. Bensaoula<sup>2</sup>, Ch. Boney<sup>2</sup> and A. Anders<sup>3</sup>

<sup>1</sup> School of Electrical Engineering & Computer Science,  
Ohio University, OH 4570, USA

<sup>2</sup> Nitride Materials and Device Laboratory, University of  
Houston, Houston, TX 77204, USA

<sup>3</sup> Lawrence Berkeley Laboratory, University of California  
Berkeley, Berkeley, CA 94720.

Investigations of luminescence properties and luminescence kinetics of Dy-implanted AlN thin films grown by molecular beam epitaxy on silicon substrate in the temperature range 12-320 K are reported. The temperature studies of photoluminescence (PL) and cathodoluminescence (CL) spectra revealed weak thermal quenching. Photoluminescence excitation spectrum was measured in the spectral range 200-450 nm. The maximum CL and PL emissions are observed from Dy at 580 nm. The excitation models for RE structured isovalent hole trap in III-nitrides is discussed. The energy transfer processes between AlN host and 4*f*-shell systems are emphasized as the main mechanisms for thermal quenching processes rather than nonradiative decay of 4*f* transitions.